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ABSTRACT

The paper describes some of the major demographic differences between hearing impaired students with normal-hearing parents and those with hearing-impaired parents, based on Office of Demographic Studies data, and attempts to illustrate the complex interaction involved between these variables, academic achievement, and early parent-child communication methods (i.e., manual or verbal). The authors, while not denying the data showing the superiority of deaf students with deaf parents on various measures of academic and social adjustments, nevertheless contend that when comparing students according to parental hearing status, to infer that such differences are due to communication history alone overlooks many educationally and personally significant variables that should be considered. (Author/DLS)

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Early Manual Communication, Parental Hearing Status, and the Academic Achievement of Deaf Students

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ABSTRACT

Hearing impaired students whose parents are also hearing impaired have been shown to perform better than their peers who have normal-hearing parents on various measures of academic and social adjustment. Many have attributed this superiority to the effects of early manual communication. One problem with this interpretation is that the group of students with hearing impaired parents differs from the group with normal-hearing parents along many educationally significant dimensions in addition to communication history. This paper describes some of the major demographic differences between these groups and attempts to illustrate the complex interactions involved between these variables, academic achievement, and communication method.

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Early Manual Communication, Parental Hearing Status, and the Academic Achievement of Deaf Students

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Of the issues related to the education and development of hearing impaired children, none has generated more interest than the question of the effects of early manual communication. For the last dozen or so years, a steady stream of studies has compared hearing impaired children of normal-hearing parents with hearing impaired children of deaf parents for a variety of educational and psychological measures. By and large, the results of these studies have been consistent: For such measures as IQ, achievement test scores, as well as various indices of social adjustment, children of deaf parents (who are presumed to communicate manually at home) typically perform better than children of normal-hearing parents (most of whom probably communicate orally within the family).

The purpose of this paper is not to take issue with these results. Indeed, later in the paper we will show data from a national sample of hearing impaired students that confirm this superiority of deaf students with deaf parents for measures of IQ and on three separate subtests of the Stanford Achievement Test. The real interest of this paper is rather to demonstrate some difficulties of making meaningful comparisons among groups of students with different parental hearing status.

Basically, we wish to step back from the research literature and, using national data collected by the Office of Demographic Studies, try to put together a picture of the many ways that the hearing impaired students with normal-hearing parents differ from the groups of hearing impaired students with hearing impaired parents. In doing so, we hope to reinforce the view that, when comparing students according to parental hearing status,

to infer that differences are due to communication history differences alone overlooks many educationally and personally significant variables that need to be considered.

Most of the data discussed in this paper are a byproduct of the 1974 national achievement testing program conducted by the Office of Demographic Studies. The culmination of this program was the development and standardization by the ODS of a special edition of the 1973 Stanford Achievement Test appropriate for hearing impaired students. This standardization was achieved by selecting a 20% national stratified random sample of special educational programs for hearing impaired children from across the United States (with a total of 10,509 students). The special edition of the Stanford was then administered to all the students age 8 and above in as many of these programs as would participate.

The national sample of 10,509 students selected for the standardization of the achievement test also formed a pool of students for further research. When the achievement tests were administered in spring, 1974, questionnaires were sent to the classroom teachers and parents of a 13% random subsample of these students.

The questions on the "Special Studies Questionnaire" were wide-ranging and included items requesting information on hearing aid usage, communication methods in the classroom, and other educational data not obtained in the Annual Survey. Altogether, 1,362 forms were distributed to the teachers of students in the subsample; 997 were returned, a response rate of 73%.

Since the response rate was not 100%, the question of the representativeness of the available subject pool must be answered. The demographic characteristics of the 997 students were compared to those of the national

group of 43,794 hearing impaired students in the 1973-74 Annual Survey of Hearing Impaired Children and Youth -- which, it should be noted, contains information on about 80% of all hearing impaired students known to be in special education programs in the United States at that time. The two groups correspond closely, so that the 997 students described here can in fact be seen as representative of the national population of hearing impaired students in special educational programs in the United States.

At the same time that the teacher questionnaire was sent out, a "Family Questionnaire" was sent to the parents or guardians of each student in the 13% subsample, the same students on whom information in the "Special Studies Questionnaire" was requested from the classroom teacher. This survey dealt with topics ranging from communication methods used at home to characteristics of siblings in the family. These 2 surveys along with appropriate achievement test scores and demographic information form the basis for this paper.

The first question that must be asked is the incidence of hearing impairment among parents of the 885 students in our sample for whom this information was provided. The vast majority, 86.8% (768), of the students reported normal-hearing parents. Only 10.3% (or 91 students) had one normal-hearing and one hearing impaired parent. This leaves 2.9%, or 26 students in the sample, with two hearing impaired parents. We think that it is important to emphasize that this is a tiny group: judging by the attention given it in the deafness research literature, one would think it much larger.

The somewhat larger group of students with one hearing impaired parent is a particularly interesting group, because very little has previously been written about it. Although we have no "hard" data, we would guess that many of the hearing impaired parents of this group of students are hard-of-hearing, as opposed to deaf. Our indirect evidence for this comes from a very recent ODS survey of nearly all hearing impaired students in Texas. In response to a question regarding the number of deaf parents, 2.3% of the Texas group reported having two deaf parents and another 2.3% reported having one deaf parent. Assuming Texas is even moderately representative of the prevalence in the United States, the discrepancy between the Texas 2.3% rate and the "Special Studies" 10.3% rate could reflect the difference in the way the question was asked: the "Special Studies" question asked about hearing impaired parents, the Texas survey asked about deaf parents. Conversely, the closeness of the rates for students with two hearing impaired parents in the two studies (2.3% vs 2.9%) implies that in the current national sample, we are dealing with parents of substantial hearing losses.

Let us now consider some of the educationally significant dimensions along which the small group of hearing impaired students with two hearing impaired parents are different from the group with normal-hearing parents. Perhaps just as interesting, we will also consider how the group with one hearing impaired and one normal-hearing parent differ from the other two groups.

One point to be made at the outset is that virtually none of the many variables to be discussed are independent of one another. They interact in complex ways -- meaning that the displaying of bivariate relationships is always an incomplete portrait. This will become clearer as the presentation proceeds.

It is very difficult to find a significant variable that, at least in some small way, is not related to parental hearing status. As compared with students who have two normal-hearing parents, students with one or both hearing impaired parents attend different kinds of educational programs, differ with respect to the extent and history of their hearing loss, come from different family backgrounds, and show different patterns of the extent to which they use speech and sign language. In light of these differences, is there any wonder that the academic achievement levels of the three groups differ?

Let us now try to construct a picture of how hearing impaired children with one or two hearing impaired parents differ from the hearing impaired children, both of whose parents hear normally.

In order to simplify our descriptive tasks, it might be easier to start with variables which, at least on the face of things, are not strongly related to parental hearing status. These are the variables age and sex. The sex and age distributions are roughly similar for each of the three groups. Hence, we will collapse across these variables in considering the other relationships.

Figure 1 shows the educational placements for hearing impaired students with both normal-hearing, one hearing impaired, and two hearing impaired parents, respectively. Whereas about 40% of the students with normal-hearing parents attend residential schools for the deaf, nearly two-thirds of the small group with two hearing impaired parents are so situated. Very few of the students with two hearing impaired parents are in part-time special education programs, i.e., "mainstreamed."

The distribution of the group of students with one hearing impaired and one normal-hearing parent is more similar to the group with both normal-hearing parents. However, fully 10% fewer of this group are enrolled in residential schools, with corresponding increases in the day school and "mainstream" categories. The factor which may most account for differential educational placement of students, when hearing status of their parents is considered, is students' degree of hearing loss. In this respect, the three groups of students are clearly different, as illustrated in Figure 2. Virtually all of the students with two hearing impaired parents had hearing losses in excess of 70 dB. On the other hand, relatively fewer students with one hearing impaired parent had losses of this magnitude, as compared with students with two normal-hearing parents.

Degree of hearing loss is well-known to be associated with educational placement (Jensema, 1974; Karchmer & Trybus, 1977): students with profound losses are likely to be enrolled in residential schools; those with less severe losses are not likely to be. To the extent that parental hearing status is related to degree of hearing loss, there is no mystery why parental hearing status also predicts educational placement.

Two variables which clearly separate the students with two hearing impaired parents from the other two groups are the age at onset of the hearing loss and the reported cause of hearing loss. Table 1 shows that 100% of the students in the sample with two hearing impaired parents were reported to have hearing losses at birth. The distributions of the other two groups did not differ -- each with about 75% of the students reporting hearing loss at birth.

Table 2 shows reported causes of hearing loss of the students in the sample as a function of their parents' hearing status. Once again, the group with one hearing impaired parent is fairly comparable to the group with normal-hearing parents -- except that the heredity category is slightly elevated and there is relatively less impairment attributed to rubella. For the students with two deaf parents, heredity is practically the only specific reported cause of deafness.

Obviously, the cause of a person's hearing loss is related to whether he or she is likely to report having additional handicapping conditions. Specifically, hereditary deafness is typically associated with low incidence of additional handicaps. Maternal rubella (the single most often reported cause of hearing loss for students with normal-hearing parents) is, on the other hand, associated with a relatively high rate of other handicaps. Figure 3 shows the inevitable trends when the percent of hearing impaired students is broken down by parental hearing status: the rate of additional handicaps for students with two hearing impaired parents is only half that of the group with two normal-hearing parents; the group with one hearing impaired parent falls squarely in between.

About 80% of all hearing impaired students in the United States receiving some special education service wear hearing aids (Karchmer & Kirwin, 1977). Figure 4 shows that the pattern of hearing aid use differs markedly by parental hearing status. A sizeable minority of the students with two hearing impaired parents wear no aid at all; most of the rest confine their use to the classroom.

Many characteristics of the families of hearing impaired students differ when they are grouped by parental hearing status. (See Rawlings & Jensema, 1977, for a discussion of family characteristics of hearing impaired students.) Although the total number of siblings in the family does not differ for the groups, the number of hearing impaired siblings does. Only about 10% of hearing impaired students with both normal-hearing parents have other hearing impaired siblings. Twice that percentage of students with one hearing impaired parent reported other hearing impaired siblings. In contrast, over three-fourths of those with two hearing impaired parents report at least one other hearing impaired sibling.

Family incomes tend to be substantially lower for those students with one or two hearing impaired parents. As of 1974, only about one-third of such families reported annual incomes greater than $10,000. Nearly 60% of the students with normal-hearing parents reported incomes in excess of this figure. Comparisons of father's education level showed similar differences in favor of the group with normal-hearing parents.

Finally, Figure 5 shows that the group of students with one hearing impaired parent has a higher percentage of black and lower percentage of white students than the group with two normal-hearing parents. In remarkable contrast to each of these groups, all but one student comprising the small group with two hearing impaired parents was white.

We turn our attention to communication patterns, a dimension which clearly discriminates our three groups of students from one another.

A detailed analysis of communication patterns of hearing impaired children is forthcoming in a monograph by Jensema & Trybus. Here we are interested only in its relationship to parental hearing status. Although a glance at the standardized deviation scores shown in Table 3 requires study longer than the period allotted how, the trends are easy to summarize: students with two hearing impaired parents tend to use less speech and more sign language than students with normal-hearing parents. Students with one hearing impaired parent, on the other hand, show the reverse trend -- more speech and less sign language.

Before discussing academic achievement, let us consider one final variable of educational interest: the child's IQ. Figure 6 gives the mean performance IQ score by parental hearing status for about 5,500 hearing impaired students taking the WISC in 1971. (Note that these data come from the 1971 ODS Annual Survey, rather than the Sample we have been describing here.) The students with both hearing impaired parents have, as a group, higher IQs by an average of 10 points, than those with none or one hearing impaired parent. These trends of course confirm what has been reported previously with smaller samples.

If all of the foregoing variables refer to "inputs" -- i.e., characteristics of students and their families, and the types of educational programs which they attend -- what about educational outcomes? Do students with hearing impaired parents achieve better in school than their peers with normal-hearing parents? By this point in the paper, we hope that you will agree that assessing educational outcomes without considering "inputs" is futile. Direct comparison of relative achievement (or any other educational outcome) of students with parents of

different hearing status is meaningless unless the many differences between these groups are taken into account.

Keeping this in mind, let us take a look at the relevant data that the ODS has accumulated in the process of norming the Special Hearing Impaired Edition of the Stanford Achievement Test. Figure 7 (from Jensema & Trybus, in press) confirms on a national basis the findings in the literature that students with two hearing impaired parents perform better than those with two normal-hearing parents. Students with one hearing impaired parent mean scores fall between the other two groups.

That the group with two hearing impaired parents score relatively well is (demographically speaking) confusing, because as we have seen, this group has characteristics which considered alone correlate positively with academic achievement -- low rate of additional handicaps, low percentage of minority status students, high mean IQ. But, it also has characteristics known generally to correlate negatively with academic achievement: low family income and parental education, high degree of hearing loss, and low use of speech (see Jensema, 1975; Jensema & Trybus, in press; Trybus & Karchmer, 1977). Resolving these seeming conflicts is a problem of certain theoretical interest.

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TABLE 1

REPORTED AGE AT ONSET OF HEARING LOSS, BY PARENTAL HEARING STATUS (SPECIAL STUDIES SURVEY, SPRING 1974)

Age at Onset	Both Parents Normal Hearing		One Parent Hearing Impaired		Both Parents Hearing Impaired	
	%	N	%	N	%	N
At Birth	76.4	(512)	75.7	(56)	100.0	(24)
Before 3 Years	19.1	(128)	16.2	(12)	0.0	(0)
3 Years or After	4.5	(30)	8.1	(6)	0.0	(0)
	100.0	(670)	100.0	(74)	100.0	(24)

TABLE 2

REPORTED CAUSE OF HEARING LOSS BY PARENTAL HEARING STATUS
(SPECIAL STUDIES SURVEY, SPRING 1974)

Cause of Hearing Loss	Both Parents Normal Hearing		One Parent Hearing Impaired		Both Parents Hearing Impaired	
	%	N	%	N	%	N
Maternal Rubella	27.9	(185)	12.9	(9)	4.0	(1)
Pregnancy/Birth Complications	13.4	(89)	17.1	(12)	0.0	(0)
Heredity	5.4	(36)	17.1	(12)	80.0	(20)
Childhood Diseases & Infections	18.0	(120)	15.6	(11)	0.0	(0)
Cause Cannot Be Determined	35.2	(234)	37.1	(26)	16.0	(4)
	100.0	(664)	100.0	(70)	100.0	(25)

TABLE 3

MEAN SPEECH AND SIGN USE BY NUMBER OF HEARING IMPAIRED PARENTS

		Speech					Signs				
Hearing Impaired Parent	N	Parent To Student	Student To Parent	Teacher To Student	Student To Teacher	Speech Environment	Parent To Student	Student To Parent	Teacher To Student	Student To Teacher	Sign Environment
None Reported	600	.02	.01	-.01	-.03	.00	-.02	-.02	.01	.02	-.01
One	39	.25	.15	.30	.39	.36	-.24	-.16	-.28	-.48	-.32
Two	18	-1.16	-.80	-.28	.05	-.81	1.11	1.08	.22	.29	.91
All Students	657	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F Ratio For One Way Anova		13.82*	6.47*	2.36	2.91	8.52*	12.67*	11.44*	1.69	4.82*	9.68*

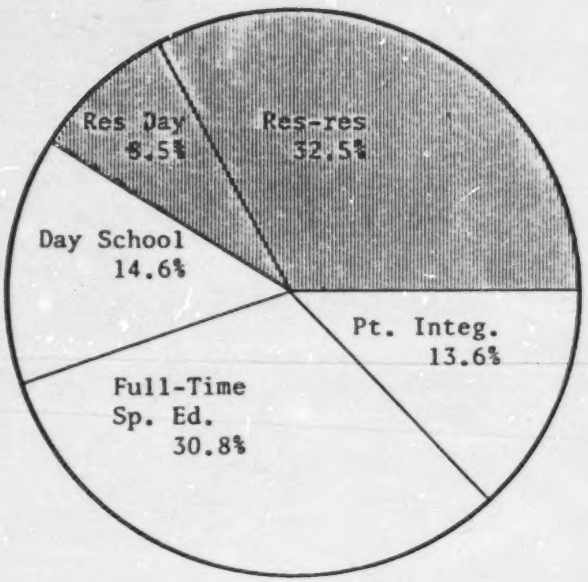
*Significant At The .01 Level

(from Jensema & Trybus, in press)

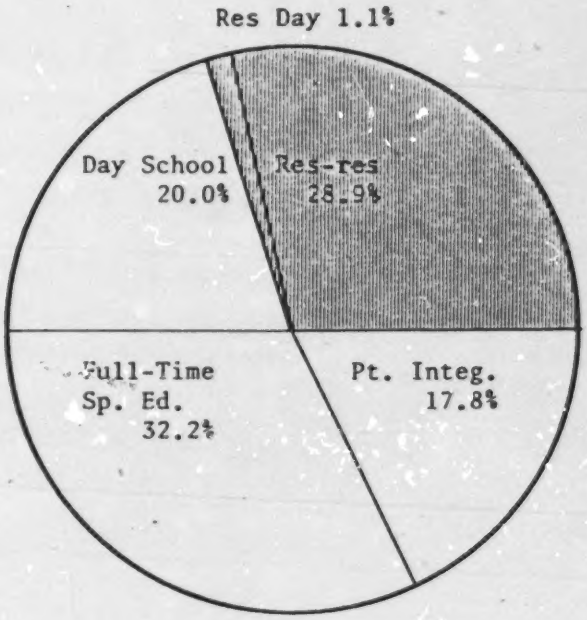
FIGURE 1

Educational Placements of Hearing Impaired Students

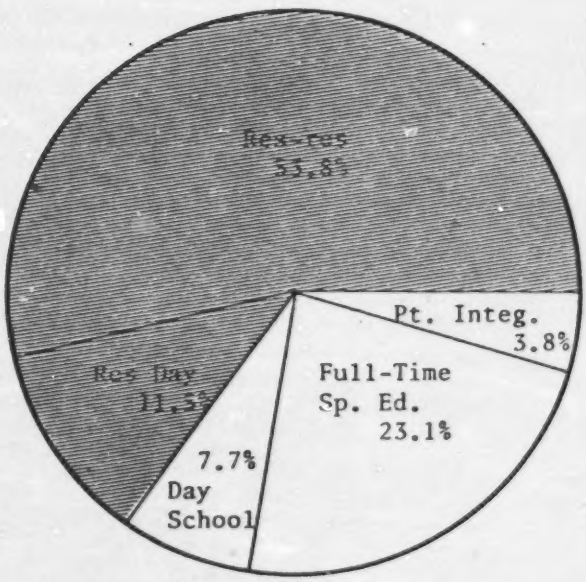
By Hearing Status of their Parents



Students with normal-hearing parents



Students with one
hearing impaired parent



Students with both
hearing impaired parents

Res res= Residential students at residential school

Res Day= Day students at residential school

Day School= Day school for the deaf

Full-Time Sp. Ed.= Full-time special education programs

Pt. Integ.= Partly integrated or "mainstream" programs

FIGURE 2

PERCENT OF HEARING IMPAIRED STUDENTS WITH SEVERE OR PROFOUND HEARING LOSSES, BY PARENTAL HEARING STATUS (SPECIAL STUDIES SURVEY, APRING 1974)

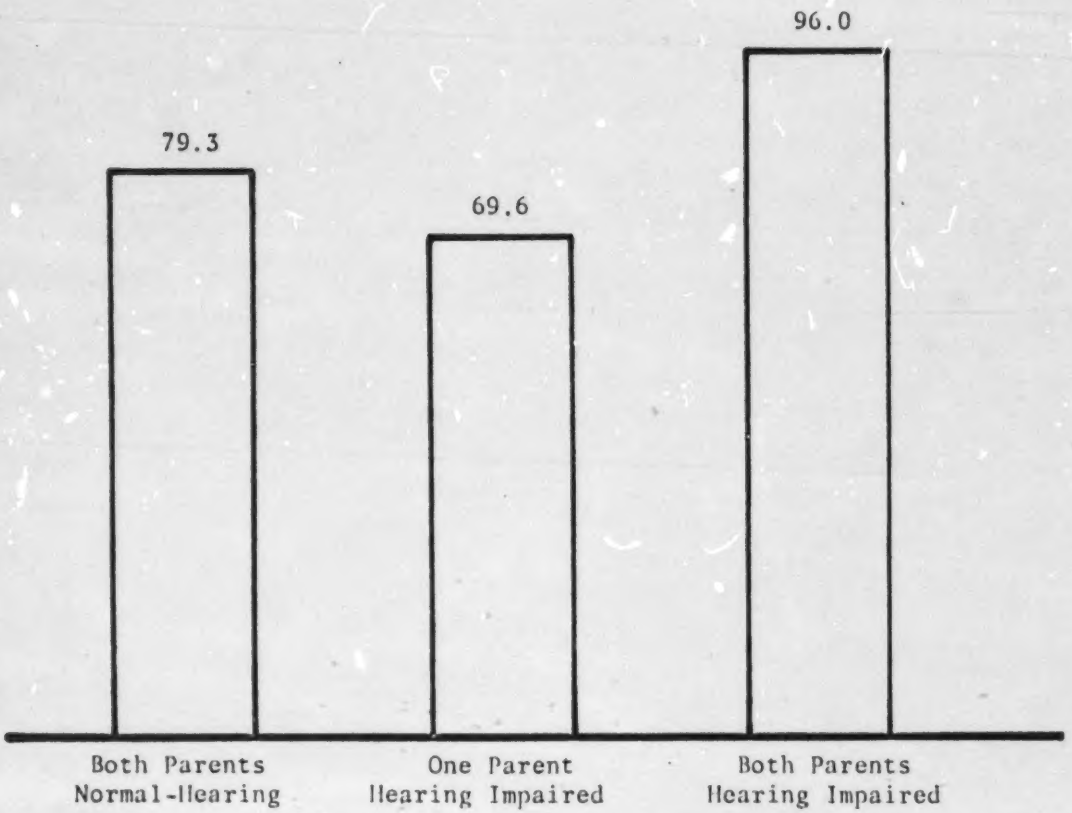


FIGURE 3

PERCENT OF HEARING IMPAIRED STUDENTS WITH ADDITIONAL HANDICAPPING CONDITIONS, BY PARENTAL HEARING STATUS (SPECIAL STUDIES SURVEY, SPRING 1974)

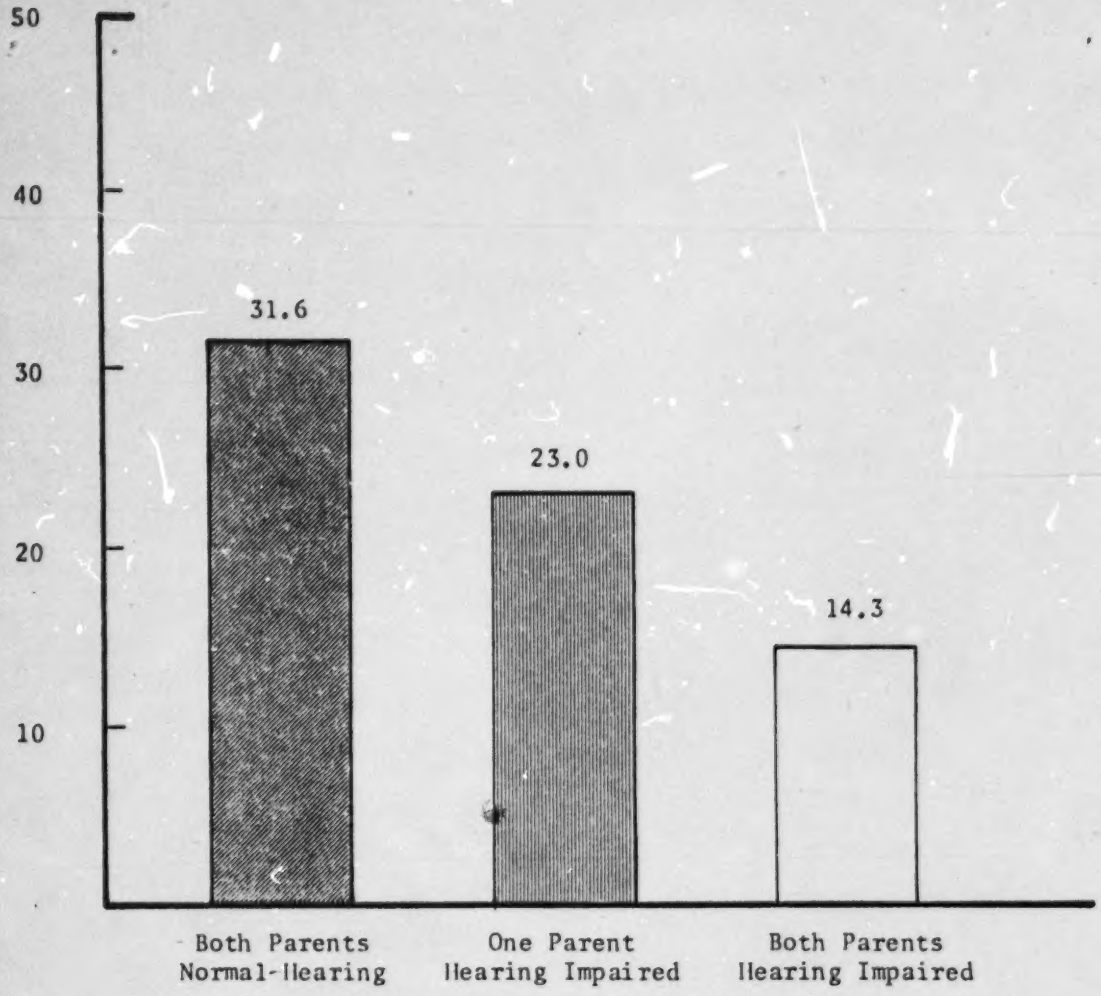


FIGURE 4

. HEARING AID USE BY PARENTAL HEARING STATUS (SPECIAL STUDIES SURVEY, SPRING 1974)

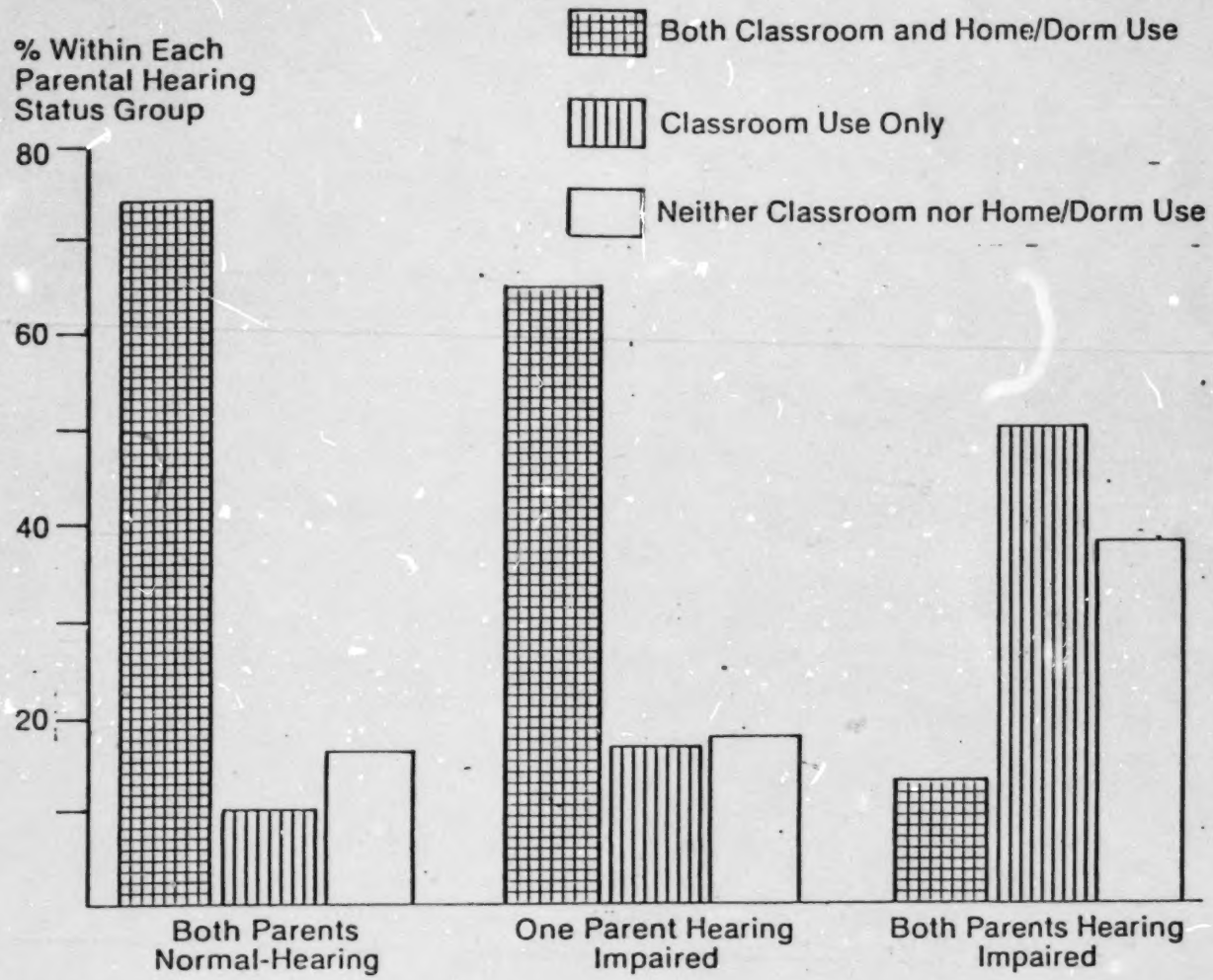


FIGURE 5

ETHNIC DISTRIBUTION BY PARENTAL HEARING STATUS
(SPECIAL STUDIES SURVEY, SPRING 1974)

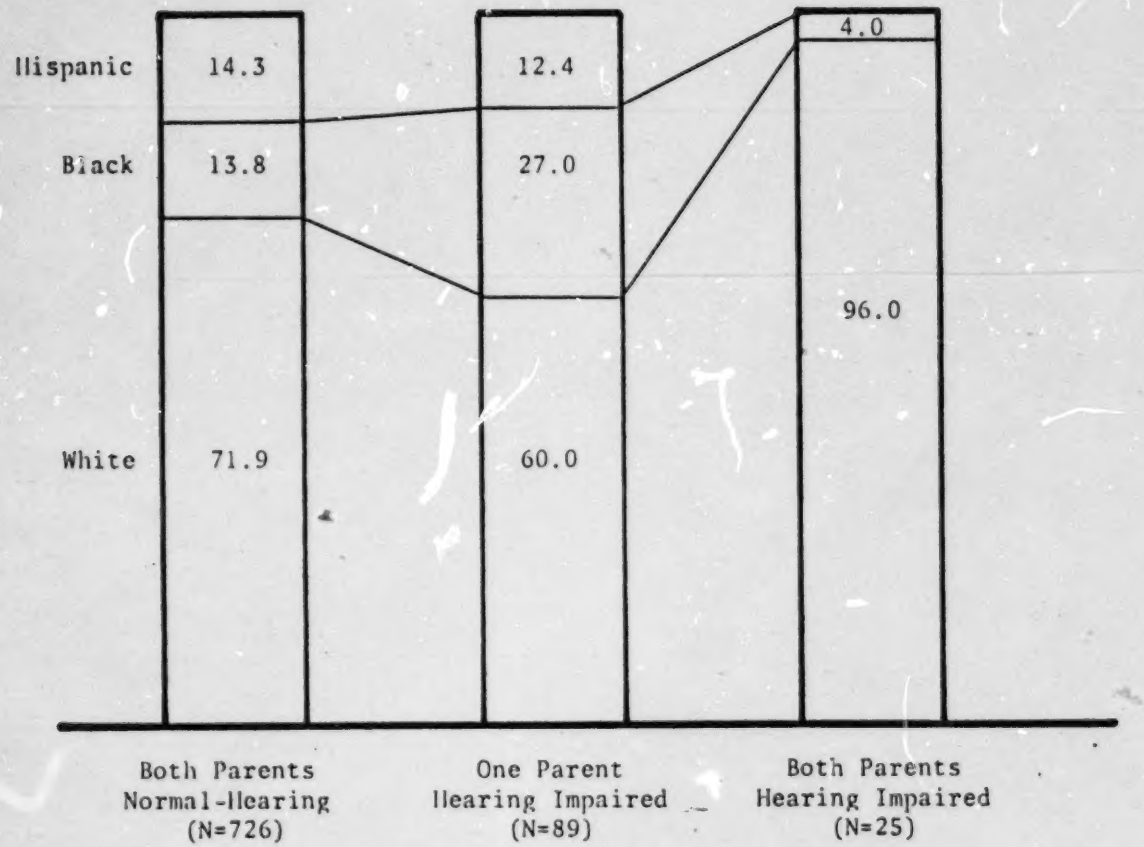


FIGURE 6

MEAN WISC NON-VERBAL IQ OF HEARING IMPAIRED STUDENTS BY PARENTAL HEARING STATUS: ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN AND YOUTH, 1971

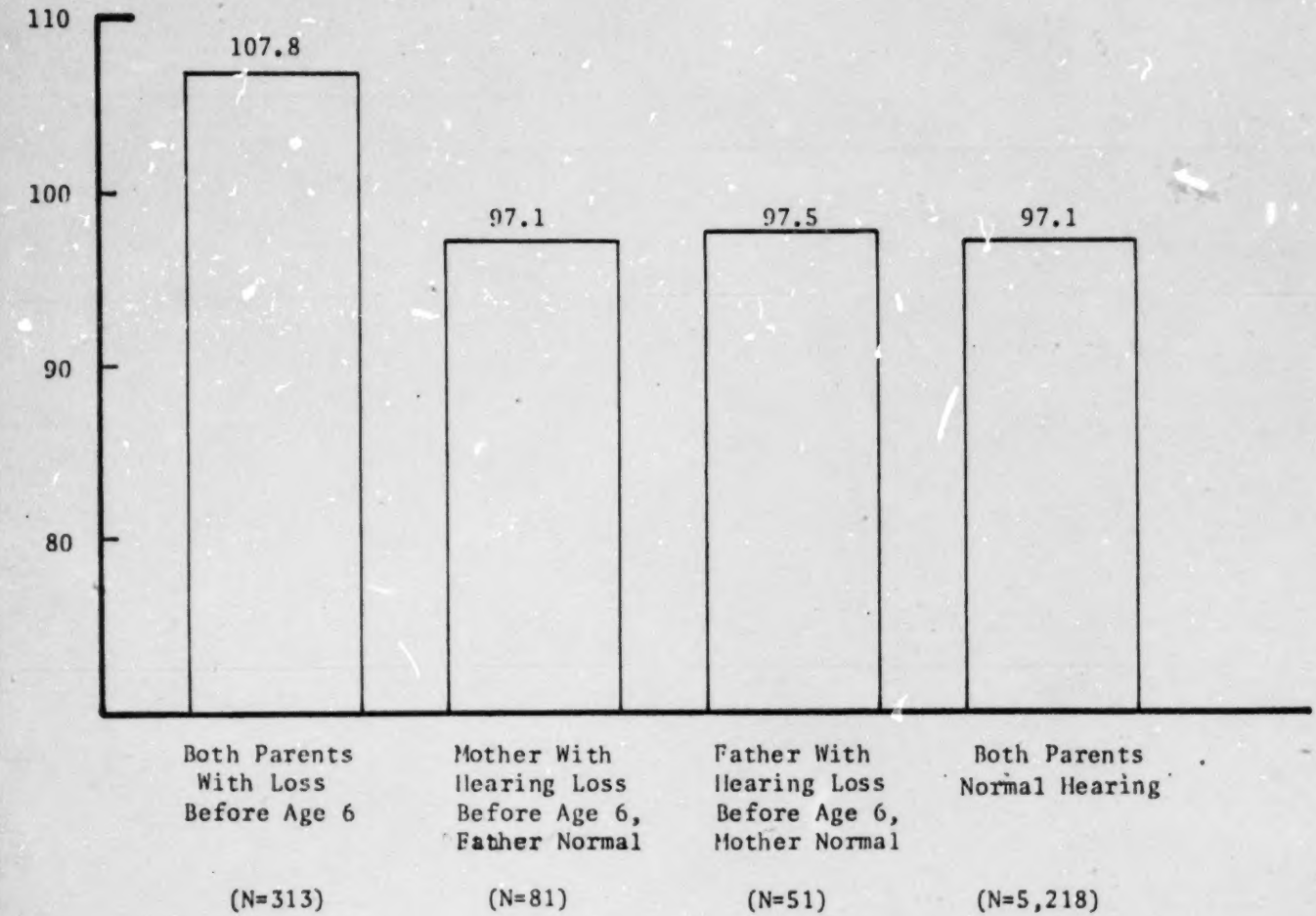


FIGURE 7

MEAN ACHIEVEMENT SCORES BY NUMBER OF HEARING IMPAIRED PARENTS

Number of Hearing Impaired Parents	N	Reading Comprehension	Mathematics Concepts	Mathematics Computation
None	412	54.7	55.9	56.5
One	26	60.8	59.6	62.0
Two	14	63.6	67.7	65.1
All Groups	452	55.3	56.5	57.1

(Adapted from Jensema & Trybus, in press)